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ARTICLE VI.

THE HEBREW COSMOGONY AGAIN.

A SECOND PAPER FOR SCIENTISTS.

BY CHARLES B. WARRING, PH. D.

IN the BIBLIOTHECA SACRA for January appeared an article in which were laid side by side Science's account (A. D. 1896) of the ante-human history of our earth, and that in Genesis (B. C. 2000 (?)), with a view of showing what correspondence exists between them; and, to bring this out more clearly, the reader was requested to note the results that would follow a denial, or perhaps it would be more accurate to say a reversal, of what Genesis says. Such reversals and their necessary effects were spread out in parallel columns.

For the satisfaction of those who have little time to study for themselves the ante-human history of our world, and who have come to regard with just suspicion statements as to what science teaches, when made by writers on this chapter, there was sent to a number of gentlemen whose position and reputation entitle them to speak with authority, a brief summary of the physical teachings of the paper under consideration, and they were requested to give an opinion as to their truth, and their order, with such remarks as they might see fit to make for the elucidation of the whole subject.

The following is the summary¹ sent to each with a reprint of the January article:—

¹ The propositions marked with an asterisk have all been established within the present half-century. It is true the second proposition has been held since the time of Moses, but only as dogma; its demonstration on grounds outside of Genesis, is a very recent achievement.

1. There was a First Cause.
- *2. The heavens and earth had a beginning.
- *3. They were at first inchoate.
- *4. Our earth then was an unsegregated part of a great gas-like or nebulous mass, infinitely tenuous, without land or water, plants or animals.
- *5. That mass was non-solid, most like a fluid.
- *6. Before motion, there was only darkness.
- *7. Motion came from the same Cause that produced the matter to which it was communicated.
- *8. After motion came light.
- *9. Light, at first poor, became good light before the earth had become opaque, and, in consequence, made a division between light and darkness.
10. That division makes what we call day and night.
11. And then was the first day on our planet.
- *12. After that, the earth was still so hot that the seas were suspended as vapor and clouds of immense thickness.
- *13. After these had been condensed by farther cooling, the air became comparatively clear, but was poisonous from the carbonic acid and other deleterious gases mixed with it.
- *14. The waters when deposited covered at first the earth, with perhaps here and there a small upraised mass of rock.
- *15. The land began to rise very slowly, and the waters to be gathered into their present basins.
- *16. (This was a long process, millions of years, during which lived the now extinct plants and animals of geology.)
- *17. At last it was completed, say in the latter part of the Tertiary, and then, in the Pliocene, the vegetable kingdom culminated in the species now living.
- *18. Still later, air and water life culminated simultaneously in the air and water vertebrates still extant.
- *19. Yet later, land life reached its finality in the mammals of to-day.

It might have been added, that this part of the earth's history naturally divides into six periods.

1. A nebulous or self-luminous period, including Nos. 2-10 inclusive.
2. A vapor-depositing period, Nos. 12, 13.
3. A period of continental and oceanic evolution, reaching from the Archaean to the Pliocene, ending with development of present plant species in the Pliocene, Nos. 14-17 inclusive.
4. A period of climatic change, the Glacial epoch. (Not treated of in this paper.)
5. The period in which appeared existing species of air and water vertebrates the Quaternary, No. 18.

6. The period of appearance of existing species of land mammals, No. 19.

The answers to these requests, together with some remarks and replies from the author of the paper, form a symposium to which the reader is invited.

G. K. Gilbert, *United States Geologist, Washington, D. C.*—"I assume that you sent your circular to me as a geologist, and therefore express opinions only as to matters on which geologic phenomena throw light.

"Propositions 1 to 12 pertain to fields of speculation in which I have little interest.

"13. There is reason to think the atmosphere once had more carbonic acid than now.

"14. The geologic evidence does not show a (the ?) condition of the earth before the existence of the land.

"15. All existing land masses have undergone changes in extent, but it remains to be proved that there has been on the whole a progressive enlargement or reduction of the total land area.

"16. The period of time represented by the sedimentary rocks, with their fossil remains, comprises many millions of years.

"17, 18, 19. The rate of change in organic forms is faster for the highly organized than for the relatively simple, and is in a general way faster for animals than for plants. As paleontologists, in the discrimination of species, are largely influenced by the amount of change, they trace existing plant species and existing invertebrate species farther back than they do existing vertebrate species.

"If you use 'culminate' and 'finality' in ordinary senses, I must take exception. It is not reasonable to suppose that the progress of biologic development, continuous for millions of years, has come to an end."

W. B. Scott, *Professor in Princeton.*—"The questions [with reference to the antiquity of existing species of water vertebrates and birds, compared with existing land mammals] are exceedingly difficult to answer, because recent species and fossil ones are distinguished, for the most part, by such different criteria, that we can rarely be perfectly sure that a fossil actually represents an existing species which, were it alive, would be recognized as such. This is especially true in the case of birds and of many mammals, when in recent geology so much attention is paid to color.

"In the case of genera, on the other hand, the matter is much clearer. Here we find that existing genera of dicotyledonous plants go farther back than any others, except a few fishes; that existing genera of fishes are older than those of birds, and that those of mammals come last. One might reasonably infer that the same order of succession would hold true of species, and this appears to be the case, so far as we may trust the determinations."

J. J. Stevenson, Professor of Geology, University of City of New York.—"I cannot bring myself to accept your hypothesis, that the writer of Genesis i. refers, in verses 11 *et seq.*, to the later geological periods only. While the hypothesis is one of the most ingenious of those offered for the reconciliation of Genesis and geology as we understand the record, it seems to be based on an exegesis that does serious violence to the text, for the actual creation of the sun and moon on the fourth day is asserted, if the Authorized Version give the proper translation.

"Your statements regarding the succession of animal and vegetable life in the later portion of geological time are in accord with the facts as we now understand them.

"Personally I feel that we cannot at present enter successfully upon the reconciliation of Genesis and geology. I believe that both are from the same hand, but feel that at present they appear to be irreconcilable. Much more knowledge must come to us before the records can be made as one. This, of course, is but an opinion, and I make no effort to convert any one to it."

W J McGee, Smithsonian Institution, Washington, D. C.—"The question as to order of development of organic life on the earth is a complex one and not easily answered in detail in the space of a letter—many treatises have already been written on the subject. It will suffice for me to say that, so far as this matter is concerned, I am in accord with the conclusions set forth in Dana's recently issued 'Manual of Geology,' which, as I judge from your pamphlet, you have at hand."

J. William Dawson, Principal of McGill College, Montreal.—"In reply to your circular of January 30, I may refer to my book, 'Eden Lost and Won,' in which I have said, in summing up the statements of the first chapter of Genesis, 'It would not be easy, even now, to construct a statement of the development of the world in popular terms so concise and so accurate.' I may also refer to more detailed explanations in my other works on this subject, 'The Origin of the World' and 'The Meeting Place of History and Geology,' etc.

"I make no remark, however, on the nineteen propositions contained in your circular, some of which, in my judgment, admit of some difference of opinion, whether viewed as interpretations of Genesis, or of results of modern science."

William B. Dwight, Professor of Geology, etc., Vassar College.—"I am of the opinion that you have given, in general, a correct scientific account of the probable succession of events in the physical and organic evolution of the world, according to modern views.

"There are two points, however, which hardly seem to me to express exactly the consensus of scientists:—

"First, so far as you represent science as attributing the origin of matter and of motion to an Eternal First Cause, called God, while many

scientists agree with you, a large number appear distinctly to avoid such a conclusion. Such are seeking any other possible explanation rather than refer it to the immanence of an eternal personal will. I would fain believe that I am wrong, but I am afraid I am not.

"Again, it does not seem to me that geologists are so doubtful as you indicate, as to the actual precedence of plant life at the outset of the development of organisms."

"It does not seem necessary, in order to establish a parallelism with the Mosaic account, to resort to the consideration of the higher development of plants in the Tertiary as compared with contemporary animals; nor that it is necessary, in order to establish the harmony, to suppose that Moses had in view only modern or existing forms."

"I see nothing to criticise in the geological statements, paragraphs 14-19, of your abstract inclosed.

"It is perhaps not absolutely certain that the present mammalian fauna is a 'finality' in the line of progress, though *apparently* so. But probably this is a needless refinement to be suggested as a criticism, though logically it has no place in the argument. As for the rest of your abstract, there are no suggestions to make other than those in my previous letter."

J. A. Zahm, *Professor of Physics in Notre Dame University*.—"I have read your article on the Hebrew Cosmogony, and I fully concur in the views you have expressed."

[After quoting from Ernest Hæckel, in his "History of Creation" (vol. i. p. 38), "Two great fundamental ideas, common also to the non-miraculous, meet us in the Mosaic hypothesis of creation with surprising clearness and simplicity; the idea of separation or differentiation, and the idea of progressive development or perfecting. Although Moses looks upon the results of the great laws of organic development . . . as the direct action of a constructing Creator, yet in this theory there lies hidden the ruling idea of progressive development and differentiation of the originally simple matter. We can, therefore, bestow our just and sincere admiration of the Jewish Lawgiver's grand insight into nature, and his simple and natural hypothesis of creation," Professor Zahm says]: "Speaking for my single self, I feel quite justified, from the standpoint of both science and theology, in accepting the traditional belief as to the Genesiac account of Creation, to wit, that its author wrote under the immediate inspiration of the Spirit of God."

E. W. Claypole, *Professor in Buchtel College, Akron, O.*—"Though a certain general resemblance may be traced between the Mosaic (?) and the geological order of events, as was done by Hugh Miller in his 'Testimony' more than thirty years ago, I am very much inclined to doubt the accuracy or wisdom of attempting to harmonize the details of the two narratives. To many minds the general resemblance is exceedingly

striking. To others the general discrepancy is equally strong. Space will not allow me here to go into detail, but a few points should be noticed in defense of the opinion above expressed.

"That life was gradually introduced on the earth is beyond question, but that it did not come in the order given in Genesis is equally certain. Again, the early condition of the earth when life was non-existent and impossible, is a logical necessity of modern science. But to interpret the language of the first verse of Genesis, 'The earth was without form and void' (whatever may be the exact meaning of *tohu-va-bohu*), so that it shall express the primeval nebulous condition when no earth, as earth, existed, and to assign this meaning to the word 'deep' (*tehom*) does not commend itself to my judgment. This conclusion is the stronger because the following verse obviously refers to this 'deep' in its usual sense of the ocean, 'The Spirit of God moved upon the face of the waters.'

"Moreover, to my mind, the Mosaic (?) narrative bears so strongly internal evidence of the prevalent astronomic or cosmogonic doctrines of the time that it is impossible to ignore them. I cannot accept any other interpretation of the term 'firmament' than that of the ancient world. The notion of an open expanse is contrary to the science of his time and irreconcilable with the use of the term *rakia* elsewhere by the Hebrew writers. I incline to the belief that the various translations have done well in their choice of words, and that the *στερέωμα* of the LXX. and the *firmamentum* of the Vulgate, adopted by King James's company, precisely conveys the Hebrew idea.

"It would be easy to multiply details, but the above are sufficient to indicate the uncertainty and insecurity of pushing the comparison of the two narratives beyond their few salient features. Even so far as this, it is difficult to go without now and then doing violence to one or the other.

"Some of the more general propositions in the latter part of the tract which you have kindly sent me are undoubtedly tenable from the standpoint both of geology and science. Such are the non-eternity of the heavens and the earth in their present condition; their unfinished state at first, and their subsequent development; the primeval existence of the waters as vapor and cloud, the dense and irrespirable nature of the early atmosphere, and the wider, perhaps world-wide, extension of the early ocean. But it is far from clear that many of these are deducible from the Mosaic (?) record.

"I regret that the opinions here expressed fall short of fully confirming the propositions of your tract, but they are the utmost in this direction which the evidence allows me to entertain. I have looked into the subject long and often for many years, I think without bias, and have studied all the important contributions to it that have appeared. But their uniform failure to carry conviction, from the time of Penn's 'Comparative Estimate' and Hugh Miller's 'Testimony' to the present day, is

very significant, and to my mind is a warning to others who would tread again the same treacherous ground."¹

Henry Morton, *President of Stevens Institute of Technology*.—"If these statements stood alone, this would be a simple matter, and might not involve ambiguity and misleading conclusions; but woven in as these statements are, in the article referred to, with certain interpretations of the text of Genesis, it is evident to me that anything like a categorical reply as to the abstract accuracy of the statements involved could not fail to be open to entire misconstruction, and would be eminently liable to be thoroughly misleading.

"I therefore take the liberty of sending you a general discussion of the subject in its entire scope, being urged thereto by a sincere conviction that the line followed in the article on the 'Hebrew Cosmogony' is a very undesirable one for the best interests of religion (which I have sincerely at heart); because distinctly retrogressive, as compared with the results of the best scholarship of the day, and only adding another to the many unfortunate attempts which have been made to show that the Sacred Scriptures were not intended to teach *religious truth* alone, but *scientific truth* as well.

"It may perhaps be asked why I, who have devoted my life to scientific study, should venture to express decided opinions on a subject involving so largely questions of interpretation and criticism. My reply is, that for many years I have devoted my Sunday and sometimes week-day leisure to the study of the works of the leading students of the Higher Criticism, and that, without laying any claim to Hebrew scholarship, I am safe in speaking with some confidence when I am quoting the conclusions of Canon Driver and other like authority.

"Having now sufficiently explained my position and motives in sending you this communication, I will proceed to develop my reasons for dissenting from the conclusions of the article on the 'Hebrew Cosmogony.'

"Reading the account of creation contained in the first chapter and first three verses of the second chapter of Genesis, as an inspired moral epic intended to teach mankind what they could never have found out for themselves as to the relations of the universe and of man to the Creator, we do not need to strain the meaning of a word or to understand it in any other sense than that which it conveyed to its writer and to those to whom it was addressed.

"We can freely accept its manifest conceptions of the heavens as a

¹ In a subsequent letter from Professor Clappole he says: "There is, I think, no doubt that the majority of our present vegetable species were in existence in the Pliocene era." "Of fishes it is doubtless true that most of existing species date back to late Tertiary, and some even to early Pliocene time. But the air and water fauna of birds and mammals cannot, I think, be separated from the land mammalia in date, and few of the latter are even of late Pliocene age."

dome supported by pillars and provided with windows, of the sun and moon as great lamps sustained from such a dome and capable of irregular as well as regular movements in relation to the earth, and of many other things inconsistent with modern science, for which no part of the Bible was intended as a text-book.

"When, however, we attempt to force the language of Genesis into meanings which may accord more or less with the results of scientific discovery, we are, I think, attempting a task as useless as it has so far proved unsatisfactory in its results.

"To point out all the errors of interpretation involved in the article referred to would occupy more time than I can devote at present, and would be unnecessary, because the work has been substantially done already by one of the greatest of living Hebrew scholars, Canon Driver, in his sermon on 'The First Chapter of Genesis,' contained in the volume entitled 'Sermons on the Old Testament' (Chas. Scribner's Sons, N. Y., 1893), and in an article on 'The Cosmogony of Genesis' in the *Expositor* (January, 1886, pp. 23-45), and again in an article in the *Andover Review* (December, 1887, p. 641), where the strained meanings given to Hebrew words by Professor Dana, in his attempt to harmonize the descriptions of Genesis with modern science, are clearly pointed out.

"It is also worthy of note that Professor Dana in the article to which the above is in part a reply, and which appeared in the *BIBLIOTHECA SACRA*, for April, 1885 (pp. 201-224), takes substantially the same position as does the author of the article on the 'Hebrew Cosmogony' in the same Journal for last January.

"I will only call attention in this place to the impropriety of applying the words translated in the Revised Version as *waste* and *void* ('And the earth was waste and void') to the nebulous gas without properties or forces which constituted the raw material of the entire solar system, sun as well as planets, when exactly the same words are used by Jeremiah to describe the desolation of the earth's surface caused by God's anger (Jer. iv. 23, 'I beheld the earth, and, lo, it was *waste* and *void*').

"Also to use the term 'waters' for the same nebulous void, when we find the same word employed for the waters of the sea into which Jonah was cast (Jonah ii. 5), or the 'deep' that 'calleth unto deep' according to the Psalmist (Ps. xlii. 7).

"Turning next to 'Science's account,' as represented in the article under consideration, I would say, that, while most of the statements there made, taken by themselves, are verbally true in a general sense, yet, as connected with each other and interpreted by the use made of them, they do not in many cases at all represent the conclusions of modern science.

"Thus to speak of the earth as 'an unsegregated part of a great gas-like or nebulous mass' is as little scientific as it would be to describe my pen as an unsegregated part of the billet of steel from which it was

made. When in the steel billet, there was no such thing as my pen, and when the solar system was a nebulous mass, there was no earth, and no way of distinguishing that part of the mass which was to form the earth from that which was to form the other planets, the sun or the moon.

"According to the nebular hypothesis, which we may assume as representing the present scientific view of the early stages of terrestrial evolution, the entire area of the solar system was occupied by a nebulous mass probably like the gaseous nebulae now observed. This cloud condensed and rotated and threw off from its equator from time to time rings or separate masses, which in turn, condensing and rotating, formed planets which in most cases threw off satellites in like manner. In time, and long after this process of planet-making had been in operation, the matter to form the earth *and moon* was thrown off, and from this in due course the moon was in like manner developed.

"At last the earth contracted and cooled enough to have a solid though red-hot surface, with a vast atmosphere of steam, but, long before this, the moon would have become cool and capable of shining only by reflected sunlight, which the sun would have been in condition to supply freely.

"As soon as the continued cooling, accompanied by cracking of the crust and consequent productions of irregularities in surface-level, and the erosive action of the, at first intensely hot and afterward cooler, water, had fitted the surface for the development of organic structures, these began to develop in their lower forms, both animal and vegetable, both keeping pace with each other in contemporaneous evolution.

"The inconsistency of this process as a whole with any reasonable interpretation of the first chapter of Genesis, regarded as a scientific account, can be removed only by straining the plain meaning of the words used in the Sacred Record on the one hand, and ignoring or setting aside many fundamental facts of the scientific theory, and giving undue prominence to certain features.

"This whole subject has, however, been so fully and ably discussed by others that it would be a waste of time for me to go over the ground again in detail. I can more usefully refer to Canon Driver as above, and to Professor Ladd of Yale, who in his popular book entitled 'What is the Bible?' (pp. 143 *et seq.*) and in his larger work 'The Doctrine of Sacred Scripture' (p. 261 *et seq.* of vol. i.) discusses the whole question in a masterly manner. Both of these books are published by Chas. Scribner's Sons, the former in 1894 (5th edition) and the latter in 1883, and are readily accessible.

"Even as far back as 1861 we find what seems to me the only sensible view on this subject, expressed in the once famous 'Essays and Reviews' in an admirable manner, by C. W. Goodwin, under the title 'On the Mosaic Cosmogony,' and, as this book is not generally accessible, I cannot, I think, do better than to quote the concluding paragraph of this essay:—

“The early speculator was harassed by no such scruples, and asserted as fact, what he only knew as probabilities. But we are not on that account to doubt his perfect good faith, nor need we attribute to him willful misrepresentation or consciousness of asserting that which he knew not to be true. He had seized one great truth in which indeed he anticipated the highest revelation of modern inquiry—namely, the unity of the design of the world, and its subordination to one sole Maker and Lawgiver. With regard to details, observation failed him. He knew little of the earth's surface, or of its shape and place in the universe; the infinite varieties of organized existences which people it, the distinct floras and faunas of its different continents were unknown to him. But he saw that all which lay within his observation had been formed for the benefit and service of man, and the goodness of the Creator to his creatures was the thought predominant in his mind. Man's closer relation to his Maker is indicated by the representation that he was formed last of all creatures, and in the visible likeness of God. For ages, this simple view of creation satisfied the wants of man, and formed a sufficient basis of theological teaching, and if modern research now shows it to be physically untenable, our respect for the narrative which has played so important a part in the culture of our race need be in no wise diminished. No one contends that it can be used as a basis of astronomical or geological teaching, and those who profess to see in it an accordance with facts, only do this *sub modo*, and by processes which despoil it of its consistency and grandeur, both of which may be preserved if we recognize in it, not an authentic utterance of Divine knowledge, but a human utterance, which it has pleased Providence to use in a special way for the education of mankind.’

“Allow me to conclude with a brief quotation from Canon Driver's sermon above cited (p. 169): ‘Or are we to imitate others, and, doing violence now to the testimony of science, now to the express words of Genesis, to seek to reconcile what—however reluctantly we may make the admission—is irreconcilable? . . . Their very discrepancies are an indication that the real object of the narrative in Genesis is not to teach *scientific* truth, but to teach *religious* truth.’”

J. E. Todd, *Professor in the University of South Dakota*.—“The Professor's article seems to me chiefly valuable for its proposal to limit the Scripture language, particularly that referring to animals and plants, strictly to the meaning reasonably supposed to be familiar to primitive man; viz., to ‘the very kinds which were then and are now extant.’ The suggestion is a novel one, and well deserving of further consideration. Some other points of less importance seem to me to be also well taken; viz., (1) when he says, ‘Nor will the verdict be greatly affected by what Moses may or may not have thought,’ and again, ‘It was not what Moses thought, but what he wrote, that is under consideration.’ (2) His statement that ‘the fourth period will be discussed satisfactorily only when it

shall be discovered when the earth's axis came to be inclined as it is now.' He might have added, when the time has been determined when the sun and moon were fully finished or, in other words, had attained their present features. On the other hand, some of his interpretations seem considerably strained. (1) In supporting the idea that the first light was imperfect, he distorts the obvious meaning of Scripture. (2) So also his conception of poisonous gases in the 'expanse' as a reason for its not being declared good. That this omission was not in the original Hebrew, is attested by its occurrence in the Septuagint. (3) His finding reference to 'the tumultuous noise of the deluge of rain falling on the hot lava crust' in the word *rakia* is very queer, to say the least. (4) The making of the so-called creative days of ordinary length and of especial historical character, separated by long intervals of time, seems also a very questionable device. (5) His assuming that 'the land and sea were essentially as now before vegetation appeared,' is quite surprising to a geologist.¹ (6) The assumption that the record of the fourth day 'has nothing to do with the creation of the sun and moon' is very difficult to admit.

"I would say, in conclusion, that these criticisms do not spring from a conviction that no harmony can be found between the history of Scripture and nature. For the writer believes, as fully as the author of this article, that there exists in the biblical account such a wonderful foreshadowing of modern discovery, such a remarkable avoidance of errors, which must have been more tempting in the early ignorance of the world, and such a general correspondence in the order of principal events with those that seem probable from the present standpoint of science, that we are constrained to believe that the record had a superhuman origin."

Asaph Hall, Professor in the United States Naval Observatory, Washington, D. C.—"I am not a physicist or a geologist, and therefore have hardly a right to appear in your list, but I think your nineteen statements are in accordance with science."

Professor Hall's opinion is entitled to great weight in his own department of astronomy, and that takes in the first twelve propositions.

George Macloskie, Professor in Princeton College.—"I cordially concur in the above [summary] as a fair statement of scientific opinion."

Heretofore writers on Genesis i. have labored under great difficulties from the peculiar character of their "science," but during the last half-century science has made enormous

¹ Professor Todd has misunderstood. The writer claims only that the sea and land were essentially as now before *present* vegetation appeared, a claim which is far from surprising to any geologist.

strides, and in nothing greater than in those departments which specially bear on the early history of the earth. It seems to me that, with the exception of two important particulars,—the work of the fourth period and the time of man's appearance,—scientists have given the world results as to everything spoken of in this account, on which one can stand without any anxiety as to whether the next decade or two will not send them to the limbo of exploded theories.

My line of argument may be, as some of my critics have said, distinctively retrograde, ill-advised, unfortunate, injurious to the best interests of religion, and all that,—a kind of comment with which every reader of history is familiar,—at least it has resulted in giving, in the most compact form yet seen, an epitome of the cosmic or *ante-dies* period, to which science can add nothing save unverified guesses as to how the planets were formed, guesses which mathematicians refuse to accept. It has resulted also in giving a scheme of the post-nebulous history that needs only to fill the lacunæ between its statements to make it complete.

The substantial unanimity of such men as Dana, Saporta, Nicholson, Le Conte (pp. 62 and 63 of the January number of the BIBLIOTHECA SACRA) and the gentlemen whose letters are given above, leaves no doubt as to what science says.

Fortunately we have a very excellent translation of the Hebrew account. In the article under consideration the physical statements of this chapter are given in the words of the Authorized Version, save that in a few instances an effort was made to get closer to the original and radical meaning. In no case has the order of the narrative been changed.

A stock objection to all attempts to get a better understanding of the Genesis account is that it was not given to teach science, which I believe as firmly as I do that the stars

were not put in the sky to teach astronomy, or the flowers in the field to teach botany. Facts and science are not always synonymous. The facts are the material from which in an imperfect way science is made, a work which has often to be done over because new facts come to light, but who ever heard, save in satire, of changing facts because of the needs of science? To me this story is a series of brief facts which science never, till within the last few decades, could understand, and is now very far indeed from exhaustively comprehending. It is very true, Genesis was not given to teach science, but only truth.

It is said, too, that Moses, or whoever wrote it, was filled with the false cosmogonic ideas of the surrounding nations, and therefore it must be that his account reflects the same. This seems more specious than real. It is well known that those peoples put the universe first, which Moses does not. And from it the gods were produced. Moses reverses this. Their gods, at least as to the heavenly bodies, are merely producers of order and arrangers. The God of Genesis created the heavens and the earth. Those nations held the month as the most important measure of time. Genesis does not even mention it. These are vital differences whose importance grows as one reflects on them.

But it may be said that certain descriptive words in the account compel us to believe that Genesis does teach the philosophy of an early day in regard to the earth's primal condition, and as to a solid firmament. No conclusion can be satisfactory which does not include their study. The first and in many respects the master word is *tohu*.

It is highly important to a correct understanding of this word to note, that of the twenty texts in which it occurs, eleven refuse to make sense when it is translated by any word save "nought," "nothing," "vanity," or the like. For instance, "graven images are all of them *vanity*," "turn aside the just for a thing of *nought*." This generic idea ap-

plies without forcing to all the cases where *tohu* is used. See the texts in any Hebrew concordance.

It is not easy to find in our language an exact equivalent of this word. Perhaps the colloquial use of "nothing" to indicate, not the absolute absence of substance or value, but something near it, comes closest to it. It is common to say a thing is worth nothing when its value is very small. We say of a room, there is nothing in it, when at the least it is full of air. Another word that comes in the same category is "vanity," not of course the psychical trait, but the older meaning, as when the preacher said, "all is vanity."

Tohu was the strongest word the Hebrews had to denote that which is close to absolute nothing, and this irrespective of whether it was so naturally, or had become so by some destructive agency. Taken in this sense, the use of *tohu* in all the cases in which it appears, becomes consistent. Whether by chance or design, it does not now concern us; it is a fact that *tohu*, if such be its meaning, exquisitely describes the nebulous matter from which our earth afterward came, since it was many thousand times rarer than air, as near nothing as the mind can conceive.

It seems to me that the underlying idea conveyed by *rakia* is the act or process of reducing the thickness of that of which it is spoken, as of hammering gold into thin plates, accompanied by violence and noise. A secondary idea is that of thinness, however produced, as when speaking of wafers, or of one's temples. Both senses are exquisitely appropriate to that time in the earth's history when it was surrounded by that enormously thick mass of clouds in which the present oceans were suspended, and recall also the noise and convulsions that accompanied the downpour on the yet hot rocks. There is no word in any language that does justice to the full meaning of this word. "Expanse," while a vast improvement over all previous translations, in that it is not absolutely false, is only a makeshift. It should

be transliterated, as has been done in other cases, such as Cherubim, Seraphim, Shekinah, and the like.¹

Granted that *tohu* means that which is as it were nothing, it becomes easy to settle on *tehom* and *mahyim*; about *bohu*, "void," there is no dispute. *Tehom*, Gesenius says, means primarily the deep sea, but, secondarily, a gulf or abyss; used even of deep hollows of the earth. Ps. lxx. 20, "Thou shalt bring me up again from the depths of the earth." It is not necessarily the sea, but any profound, awe-inspiring deep.

Mahyim undoubtedly means usually "water," but is used also for several other things, e. g., the juice of the hemlock or poppy, the liquor of the gall bladder, *semen virile* and *aqua pedum*. It is derived from a root signifying "to flow" (Gesenius), and appears to be the equivalent of our word "fluid." It is that which is non-solid, easily flowing, and as such would be applicable to a gaseous fluid at rest, in distinction from *ruach*, "the wind," i. e., air in motion.

I have pointed out, on page 56, how well these four words describe what we now know was nebulous matter.

The view of this account advocated by Professor Morton after years of Sabbath reading of the works of the leading students of the Higher Criticism, is the logical outcome of the long series of failures of the reconcilers to make this story harmonize with their *a priori* ideas of what God intended to teach by it, and their erroneous beliefs as to what really occurred. At first they thought the Bible taught all science, and conjured up out of their imaginations a cosmology to suit their exegesis. Then they changed their cosmogony, compelled thereto by proof that the old was false. Still later, and in very recent times, we find them saying, to meet some supposed exigency, that once the days were not accurately defined, that the stars and sun were dark bodies

¹ For a full discussion of this word, see Genesis I. and Modern Science (Hunt & Eaton, New York), pp. 79-97.

which were lighted up, so late as after the appearance of fruit-trees, by phosphorescent matter which up to that time had enveloped the earth. I do not wonder that some have gone to the opposite extreme, and declare that this story was intended to teach nothing, save that God created all things, and other than that, its statements are not true, were never meant to be true, and their order is incorrect. This being so, the believers in the Bible could no longer be annoyed by the attacks of scientists, for, having acknowledged that the story was all wrong in cosmic matters, there was nothing left to defend.

There is, however, a third course which has escaped their observation. It is that which I have endeavored to follow in the paper under consideration. *First.* Rid the mind of all *a priori* notions as to what God did, or did not, intend to teach. *Second.* Eschew all imaginary science. *Third.* Taking the words exactly as they stand, and in their most literal sense, and making no change whatever in the order of the statements, see whether these, taken one by one, have each a counterpart in the world's history. *Lastly.* Shrink from no conclusion to which one is logically brought, although it should be fatal to former theories, however long held. I should add that in this way of studying the Genesis account, nothing in it is too minute to escape careful examination. One wants to know why so many things are called good, and so many others of even greater importance fail to receive that verdict; why land plants are placed before water animals, and birds put with water animals instead of land animals. Then there are the days, and the curious formula, There was evening and there was morning. Day one (R. V.). Results arrived at in this way will at least be permanent, and, if there are the agreements that I think I see, then will be a good time to raise the entirely independent question as to how so many, each in its true order, occurred.

All that is asked for this kind of study is that it have a fair chance. That it is revolutionary, is, to a mind imbued with the scientific spirit, a matter of little moment.

Without going into any argument with those who condemn my exegesis, and omitting all reference to the statements containing the disputed words *tohu* and *rakia*, I will now lay before the reader what all must admit the story says, and ask whether that much is not true. And then, whether, possibly, I am not right about the rest ?

I read in Genesis that the heavens and earth had a beginning, and the science of 1896 says that it is so.

I note that these after their creation are not pronounced good, and that is also true. They needed long time and preparation to bring them to their present state.

I read, a little further on, that before motion there was darkness, and that after motion light appeared, and now I know that is a fact. I read that light was perfected before there was a division between it and darkness, and my spectroscopic friends assure me that is right. That is just what did occur.

It was after this that light was called Day and darkness Night. My astronomical friends say, that previous to such division there was light everywhere, but no day and night, just as now in the sun.

Further on I read that the production of the firmament was not pronounced good; and when I look to see if there is any fact in our world's history that in any way corresponds, I find that the atmosphere was then loaded with poison; it was not good.

Further on I read that the early waters were gathered unto one place, and the dry land appeared. I turn to my geology, and read that the land has been under water, and that the various ocean basins are really one. I read that, after the land and water are pronounced good, the grasses, herbs, and fruit-trees known to the writer of this account, made

their appearance; and when I turn to my geological friends they tell me, existing species of the plants did appear in the Pliocene, and that it was after the completion of the continents and waters.

Passing over the next transaction, of which science knows too little to speak, I find the writer saying that water and air creatures, the present species, for they were the only ones of which he had any knowledge, appeared together in a later period than the plants. Turning to Dana and other geologists I find them saying the same thing. Present species of plants in the Pliocene, present species of water vertebrates and birds in the Quaternary.

In Genesis, I find put last, cattle, beasts, the land mammals of to-day, and my geology tells me the same story.

Can any modern cosmogonic work show as much truth in the same space? Can any one be found touching on these themes, and written fifty years ago, in which it is not easy to pick out gross errors?

Is not this chapter worth looking into?